Claims

What is claimed is:

1. A multistage amplifier for amplifying light over a wavelength band comprising:
a first span of amplifying fiber;
a second span of amplifying fiber optically coupled with the first span;
a gain flattening filter (GFF) in-line with at least one of the first and second spans of amplifying fiber for attenuating predetermined wavelengths of amplified light, WHEREIN A FIRST gain spectral response of the first and second spans of amplifying fiber including the GFF measured over the wavelength band has shape of a ripple that oscillates as a function of wavelength such that a plurality of peaks in the form of maxima and valleys in the form of minima occur at a plurality of different wavelengths, each different wavelength corresponding to a different channel; and,
a second compensating filter in-in line with one of the first and second spans of fiber having a SECOND spectral response that has a second plurality of peaks in the form of maxima and valleys in the form of minima, wherein the second spectral response is absent at least 50% of four most predominant peaks or valleys at channels where peaks or valleys, respectively, were present in the first spectral response, and WHEREIN a maximum ripple amplitude in the second spectral response is less than a maximum ripple amplitude in the first gain spectral response.

2. A multistage optical amplifier as defined in claim 1, wherein the GFF is downstream of the first span of amplifying fiber and is disposed to receive light from at least one of the first and second spans of amplifying fiber.

3. A multistage optical amplifier as defined in claim 1 wherein the second compensating filter is a Bragg grating.

4. A multistage optical amplifier as defined in claim 2, wherein the second compensating filter is a Bragg grating and wherein the second spectral response has minima at least 10% of wavelengths where peaks were present in the first spectral response.

5. A multistage optical amplifier as defined in claim 3 wherein the wavelength band is from 1525 to 1565 nm and wherein the amplifying fiber is rare earth doped.

6. A multistage optical amplifier as defined in claim 1 wherein the second compensating filter is disposed between the first and second spans of optical fiber.

7. A multistage optical amplifier as defined in claim 1 wherein the GFF is disposed between the first and second spans of optical fiber.

8. A multistage optical amplifier as defined in claim 1, wherein the second filter has a random spectral component designed into the filter so that at least a portion of the output response of the second compensating filter is random.

9. An amplifier for amplifying light over a wavelength band comprising:
a first span of amplifying fiber;
a gain flattening filter (GFF) in-line with the first span of amplifying fiber for attenuating predetermined wavelengths of amplified light, WHEREIN A FIRST gain spectral response of the first span of amplifying fiber including the GFF measured over the wavelength band has shape of a ripple that oscillates as a function of wavelength such that a plurality of peaks in the form of maxima and valleys in the form of minima occur at a plurality of different wavelengths; and,
a second compensating filter having a SECOND spectral response that has a second plurality of peaks in the form of maxima and valleys in the form of minima, wherein the second spectral response is absent at least 50% of peaks at wavelengths where peaks were present in the first spectral response, and WHEREIN a maximum ripple amplitude in the second spectral response is less than a maximum ripple amplitude in the first gain spectral response.

10. An amplifier as defined in claim 9, wherein the amplifying fiber is erbium-doped fiber.

11. A compensating optical filter for placement in-line with a gain flattening filter in an optical amplifier, the compensating optical filter having an output gain response when cascaded with the gain flattening filter in an optical fiber amplifier such that 50% of 8 ripples and/or valleys present at 8 wavelengths in an output spectrum of the amplifier absent the compensating filter are absent at said 8 wavelengths when the compensating filter is in-line with the gain flattening filter.